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EXAMINER
RAD, S

ART UNIT	PAPER NUMBER
2814	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

08/930,449

Applicant(s)

Abe et al.

Examiner

S.H. Rao

Group Art Unit

2814

☒ Responsive to communication(s) filed on Jan 31, 2000

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 1-2,4-63 is/are pending in the applicat

Of the above, claim(s) 19,24,29,34,39,44,45 and 50. is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-2,4-18,20-23,25-28,30-33,35-38,40-43,46-49 and 56-63 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Applicants amendment entered February 08, 2000 has been considered. Applicants state that claims 1-63 are pending (remarks line I). The more correct situation is that claims 19,24,29,34,39,44,45,50 to 55 were withdrawn in the previous office Action.

Therefore the claims currently being considered are :

Claims 1,12,20,25,30,35,40,46,56 and 58 as amended by the amendment of February 8, 2000.

Claims 2,4-11, 13-18, 21-23, 26-28,31-33,36-38,41-43,47-49,57,59-62 as amended by the supplementary amendment of December 11, 1997.

Claim 63 added by the amendment of February 8, 2000.

Claim Rejections - 35 U.S.C. § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 4-18,20-23,25-28,30-33,35-38,40-43 and 63 rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, and further in view of Nakamura.(Both cited in the previous office action. Claims 46-49 are rejected as being unpatentable over Zhang and Nakamura and

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further in view of JP58-90722 (cited in applicants IDS). Claims 50-55 are rejected for the same reasons as stated in the previous office action. Claims 56-62 are rejected as being unpatentable over Zhang and Nakamura and further in view of JP 163406(cited in applicants IDS).

With respect to claims 1 and 12, Zhang in combination with Nakamura describes a method of forming a crystalline film, including the steps of:
forming a thin film having a surface on a substrate (Zhang nickel layer # 2 in Fig.2 (A-2) on silicon film 1).

Crystallizing at least a surface layer of the thin film by selectively applying energy to the surface of the thin film, such that at least the surface layer of the thin film is melted and crystallized under a hydrogen- containing atmosphere. (Zhang col. 12 lines 45-58).

Zhang does not specifically disclose selectively applying the energy. However official notice is taken that selectively applying energy is a well known process. Further, Nakamura in col. 4 lines 60-65 discloses selective energization through a window.

Zhang and Nakamura are analogous art because they both deal with semiconductor devices.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to include Nakamura's selective energy supply in Zhang's method to accurately anneal the amorphous silicon by mere heat treatment for a shorter time.

Claims 2, 4-11 and 13-18 depend on claim 1 and are rejected for reasons stated in the previous office action and included here by reference.

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With respect to claim 20, Zhang in combination with Nakamura describes a method of forming a crystalline film, including the steps of :

wherein the a surface layer of the thin film is crystallized by supplying high energy to the thin film. (Zhang col. 12 lines 45-58)(Nakamura in col. 4 lines 60-65). Further contrary to applicants contention, Nakamura in fig. 6 places its window (#52) as far away as possible from the surface to be treated (# 53 or # 52) thereby there is no adherence or very minimal adherence of the components of the thin film when the high energy is supplied to the thin film.

Claims 21-23 depend on claim 20 and are rejected for reasons stated in the previous office action and included here by reference.

With respect to claim 25, Zhang in combination with Nakamura describes a method of forming a crystalline film, including the steps of :

Claim 25 repeats all the steps of claim 20 and further adds the limitation of a wall in the supply chamber.

Nakamura in Fig. 6 discloses a chamber 51 with a wall having a window, wherein the distance between the introduction window (# 52) and the thin film (# 53 or 54) is larger than a shortest distance between the wall (Chamber 51 side wall) and the thin film. Even assuming that the high energy is supplied with a distance between the introduction window and thin film is larger than a shortest distance between the wall and the thin film , this recitation without showing the criticality or unexpected results by this arrangement does not patenably distinguish over the prior art.

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Claims 26-28 depend on claim 25 and are rejected for reasons stated in the previous office action and included here by reference.

With respect to claims 30 and 35, Zhang in combination with Nakamura describes a method of forming a crystalline film, including the steps of :

Claims 30 repeats all the steps of claim 25 and adds supplying high energy to the thin film at a pressure differential.

In addition to teachings stated under claim 25 above the pressure differential is taught by Nakamura. The high energy being supplied to the thin film that is set in the supply chamber through the window that is disposed at a location resistant to adherence of components of the thin film, and the supply chamber also has an exhaust port wherein the pressure in the vicinity of the introduction window is higher (atmospheric) than the pressure (Vacuum) in the vicinity of the thin film in the supply chamber. (See also Col. 4, line 57). The recitation, "a pressure in a vicinity of the thin film higher than the pressure in a vicinity of the exhaust port in the supply chamber." will inherently occur when the air in the supply chamber is exhausted.

Claim 35 repeats all the limitations of claim 30 and adds an exhaust port, Nakamura Fig. 6 # 61 is an exhaust port.

Claims 31-33 and 36-38 depend on claim 30 and 35 respectively and are rejected for reasons stated in the previous office action and included here by reference

With respect to claim 40, Zhang in combination with Nakamura describes a method of forming a crystalline film, including the steps of :

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Claim 40 repeats all the steps of claim 5 and adds that the energy is supplied in the same direction as the irradiation path.

In addition to the teachings of claim 35 stated above Nakamura in fig. 6 shows the energy is supplied in the same direction as the irradiation path. (both perpendicular to the silicon surface being treated.

Claims 41-43 depend on claim 40 and are rejected for reasons stated in the previous office action and included here by reference.

With respect to claim 46 , Zhang in combination with Nakamura and JP-58- 90722 (applicants' IDS) describes a method of forming a crystalline film, including the steps of :

Nakamura in figs. 1 to 3 and 6 discloses forming a crystallized thin film on a substrate by high energy crystallization in a high energy supply apparatus which includes a generation source for generating a high energy and supply chamber . The supply chamber including an introduction window that introduces the high energy into the supply chamber . The high energy being supplied to the thin film that is set in the supply chamber through the window that is disposed at a location resistant to adherence of components of the thin film, wherein the high energy is supplied to the thin film in direction normal to the thin film, that is shifted from the direction of the irradiation path.

The combination of Zhang and Nakamura does not specifically disclose the high energy supplied to thin film wherein the normal angle of the film is shifted by an angle. However JP58-

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90722 in Fig. 2 discloses high energy (100) being supplied wherein the normal angle of the film is shifted by an angle.

Zhang, Nakamura and JP-58-90722 are all analogous art because they deal with semiconductor manufacture.

At the time of the invention a person of ordinary skill in the art would have combined the teachings of Zhang, Nakamura and JP-58-90722 to more evenly and quickly irradiate the thin film supply the high energy.

Claims 47-49 depend on claim 46 and are rejected for reasons stated in the previous office action and included here by reference.

With respect to claim 56, Zhang in combination with Nakamura and JP-163406 describes a method of forming a crystalline film, including the steps of:

Claim 56 describes all the steps of claims 40 and 46 and adds a part of the high energy is reflected by the thin film to form reflected energy that irradiates a second portion of the thin film. The combination of Zhang and Nakamura does not specifically disclose a part of the high energy is reflected by the thin film to form reflected energy that irradiates a second portion of the thin film.

However Japanese patent publication No. 16 3406 figs. 4, 6 and 8 describe a part of the high energy is reflected by the thin film to form reflected energy that irradiates a second portion of the thin film.

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Zhang, Nakamura and JP-163406 are all analogous art because they deal with semiconductor manufacture.

At the time of the invention a person of ordinary skill in the art would have combined the teachings of Zhang, Nakamura and JP-58-90722 to avoid any waste of the high supplied due to dissipation by reflecting the energy in the remote areas and reusing it (high energy).

Claims 57-62 depend on claim 56 and are rejected for reasons stated in the previous office action and included here by reference.

Claim 63 depends on claim and is rejected for reasons stated under claim 3 in the previous office action and included here by reference.

Response to Arguments

Applicant's arguments filed January 31, 2000 have been considered but they are not persuasive in view of the above discussion and for the following reasons.

Applicant's arguments are moot in view of the new rejections.

The pending claims are obvious for the reasons discussed in the 103 grounds of rejection above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136 (a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136 (a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Steven H. Rao whose telephone number is (703) 306-5945. The fax number is (703) 308-7722 or -7724. The Examiner can be normally reached on Monday-Friday from 9.30 a.m. to 6.00 p.m. (EST).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's Supervisor Ex. Olik Chaudhuri, can be reached at (703) 306-2794.

8. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission at the above mentioned fax numbers.

9. Any inquiry of a general nature or relating to the status of this application should be directed to the Technology center 2800 receptionist at (703) 308-0956.



April 10, 2000.


Olik Chaudhuri
Supervisor
Technology Center 2800